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THE UNITED STATES OF AMERICA

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UNITED STATES DEPARTMENT OF COMMERCE

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July 08, 2005

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APPLICATION NUMBER: *60/547,563*
FILING DATE: *February 26, 2004*
RELATED PCT APPLICATION NUMBER: *PCT/US05/06343*

Certified by

Jon W. Dudas

Under Secretary of Commerce
for Intellectual Property
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01919 U.S. PTO

022604

PROVISIONAL APPLICATION FOR PATENT COVER SHEET

22264 U.S. PTO 60/547563 022604

This is a request for filing a PROVISIONAL APPLICATION FOR PATENT under 37 CFR 1.53(b)(2).

INVENTOR(s)/APPLICANT(s)

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☐ Additional inventors are being named on the ___ separately numbered sheets attached hereto.

TITLE OF THE INVENTION (280 characters max)

IONIZING RADIATION TREATMENT SYSTEM ON WATER-BORNE PLATFORM

CORRESPONDENCE ADDRESS

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ENCLOSED APPLICATION PARTS *(check all that apply)*

☒ Specification *Number of Pages* [3] ☐ CD(s), Number ___

☐ Drawing(s) *Number of Sheets* [ ] ☐ Other *(specify)* ___

☐ Application Data Sheet. See 37 CFR 1.76

METHOD OF PAYMENT OF FILING FEES FOR THIS PROVISIONAL APPLICATION FOR PATENT *(check one)*

☐ Applicant claims small entity status. See 37 CFR 1.27

Filing Fee Amount: $160.00

☒ A check or money order is enclosed to cover the filing fee

☐ The Commissioner is hereby authorized to charge filing fees or credit any overpayment to Deposit Account Number: 02-2135

☐ Payment by credit card. Form PTO-2038 is attached.

The invention was made by an agency of the United States Government or under a contract with an agency of the United States Government.

☒ No.

☐ Yes, the name of the U.S. Government agency and the Government contract number are: ___

Respectfully submitted,

SIGNATURE Vincent M DeLuca Date 26 FEB 04

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REGISTRATION NO. 32,408

Docket Number: 2592-110

USE ONLY FOR FILING PROVISIONAL APPLICATION FOR PATENT

INVENTION DISCLOSURE
February 12, 2004

TITLE: Ionizing radiation treatment system on water-borne platform (SeaScan™)

PURPOSE OR OBJECTIVE OF INVENTION AND DESCRIPTION OF THE SUBJECT MATTER:

The objective of this invention is the creation of a water-borne platform to house and transport an integrated ionizing radiation treatment system. This system is used to treat a wide range of materials, to include but not be limited to, food, mail, contaminated bulk materials, mulch, soil, etc. for the purpose of either decontaminating material known to be contaminated, or proactively treating materials as a precautionary means of mitigating a contamination threat, whether such contamination might result from unintentional acts, intentional acts, or acts of nature.

By providing such a system on a water-borne platform, the SeaScan™ concept exploits 1) "intrinsic shielding" provided by a barge, or other water-going vessel, 2) field expedient shielding" provided by the neighboring water in which the vessel floats, as well as surrounding structures against which the vessel may be moored, and finally, 3) a limited quantity of "dedicated shielding" from steel, lead, concrete, or other high density material, which is designed into the system as needed to complete the total radiation shielding solution. The reduction in dedicated shielding, extremely massive in typical (fixed-site) radiation processing systems, enables greater transportability, enhanced flexibility of treatment operations, and reduces the cost of the system plus the resulting treatment cost per pound of material processed.

The SeaScan™ system contains an integrated radiation source(s), material handling hardware, contamination measurement/control systems, and process control systems to ensure efficient, safe, and effective handling of a wide variety of materials.

PERTINENT ART:

There are no known U.S. or foreign patents for a SeaScan-like system.

ADVANTAGES OF SEASCAN™ OVER CURRENT TECHNOLOGIES:

The SeaScan™ system will:

- Provide a highly mobile means of conveyance for an ionizing radiation system (either X-ray and/or electron beam system).
- Provide a reactionary capability to rapidly deploy an ionizing radiation treatment system directly to the site of a crisis or on-going condition requiring decontamination or pathogen reduction in bulk materials contaminated or

infiltrated with: naturally-occurring pathogens or infestations, biological warfare pathogens, chemical warfare agents, or other toxic materials.
- Requires significantly less dedicated radiation shielding by exploiting intrinsic shielding and/or field-expedient shielding available at the deployed sites.
- Minimizes dedicated shielding (typically extremely massive), reduces system costs, and further enhances transportability.
- Allows loading of contaminated materials in populated areas, while processing can be performed away from populated areas, if desired.

CLAIMS:

The SeaScan™ system will:

1. Provide a waterway-deployable ionizing radiation treatment system capable of addressing a multitude of uses not limited to, but to include:
    a. Be used for chemical/biological/toxic agent decontamination of bulk materials
    b. Be used for decontamination of byproducts resulting from surface, personal, or large area decontamination processes
    c. Be used for medical component sterilization
    d. Be used for electronic pasteurization of food
    e. Be used for medical waste management
    f. Be used for mass fatalities management (including treatment of fatalities contaminated in chemical or biological warfare incidents or attacks.
    g. Be used for processing of contaminated forensics material for evidence collection and DNA identification/matching
    h. Be used for mail irradiation as either a pre-emptive processing or as a prophylactic measure in case of an ongoing threat
    i. Be used for any contaminated material or material that might have agents/pathogens that must be obviated to attain prescribed safety/risk levels.
2. Provides means to minimize the need for dedicated shielding (i.e., material provided in the system and deployed with the system to a field site, which provide ionizing radiation shielding to protect the system operators and nearby persons and wildlife.)
    a. Use intrinsic shielding provided by the water-borne vessel's structure as a component of the total radiation shielding solution.
    b. In custom configurations, enhance the intrinsic radiation shielding by modifying the typical placement, thickness and material of the water-going vessel's hull, structural members, and systems (including propulsion systems and fuel cells).
    c. Use water pumped into containers or compartments on or in the barge, and/or into the hull of the barge, at the deployed site as field-expedient elements of the total radiation shielding solution.

d. Take advantage of the water surrounding the water-borne vessel as radiation shielding intrinsic to the concept of a floating radiation treatment platform.
e. Further enhance the shielding provided by surrounding water, by enabling treatment of material within the water-borne vessel's hull at a position below the waterline.
f. Use surrounding piers as field-expedient elements of the total radiation shielding solution.
g. Use adjacent water-going vessels as field expedient elements of the total radiation shielding solution

3. Achieve cost savings in the system through reduction in dedicated shielding
   a. Use a small amount of high density dedicated shielding to augment intrinsic and field-expedient shielding available due to the water-borne platform configuration and deployment mode.
4. Achieve enhanced transportability (i.e., enhanced seaworthiness, reduced draft of vessel, reduced propulsion requirements) through reduction in dedicated shielding.
5. Achieve greater net cargo capacity (weight and volume) through reduction in dedicated shielding.
6. Utilize either dock side or water-borne platform-side material loading and unloading, or a combination of both, as appropriate to the conditions at any given deployed site and for the nature of contamination present or suspected.
7. Process material that has been contaminated with a wide variety of biological, or chemical agents, molds as well as insect infestations.
8. Process material in a stationary mode or water-going (i.e. moving) mode.
9. Process material loaded at a dock, offshore to enhance safety to populated land regions.
10. Operate independently (with its own power generation system).
11. Operate using shore-based power.
12. Contain separately a "hot" zone (where contaminated materials are routed) and a "cold" zone (where clean materials are routed).

CURRENT STATUS:

The following reflects the status of the development of the SeaScan™: The inventors have conducted computational analyses for a variety of radiation shielding configurations, safety levels, and operational throughput settings. For one barge-based system, an optimized design point has been determined with cost-effectiveness as the primary metric (i.e. maximum through-put performance for the minimum overall cost).